



Webpage Controlled LED Matrix Display (Rev 1.0)

Avnet BCM4343W IoT Starter Kit

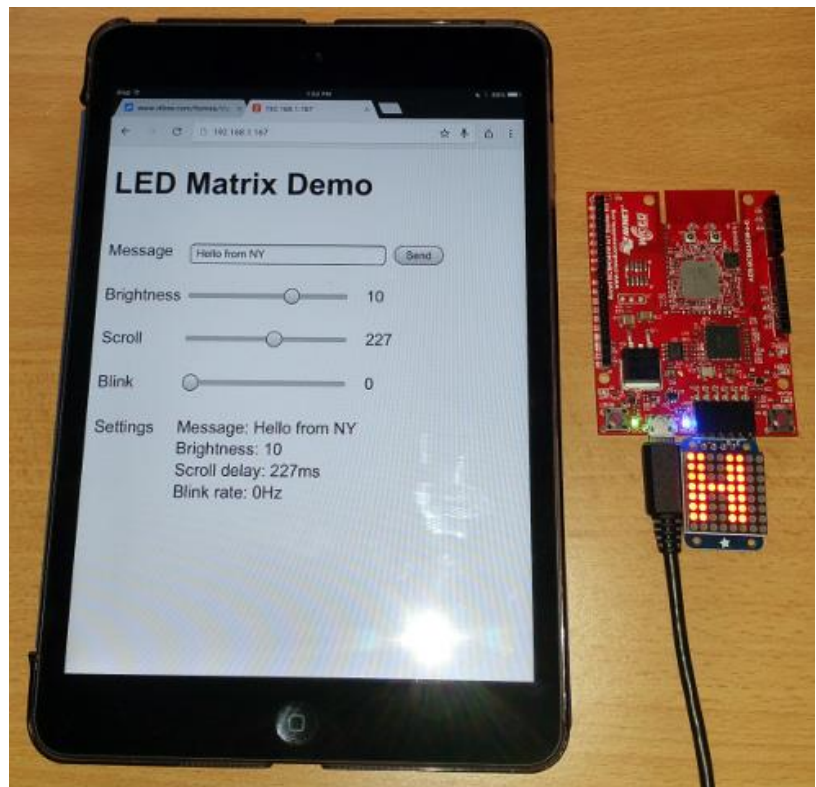
Overview

This application demonstrates Wi-Fi remote control of a custom scrolling LED Matrix display.

Control is by means of a dynamically updated webpage, served from an http server running on the Avnet BCM4343W module

This facilitates user control of:

- Message Content (defined on the fly by user entry into text-box)
- Brightness of LED Matrix (level 0 to 15)
- Scrolling Delay (10 to 400 ms)
- Blink Rate (0 to 0.5 Hz)



Requirements

- ZentriOS SDK (version 3.2.0.2 or later)
- Serial Console application (eg. TeraTerm or Putty)
- Internet Browser on Lab Computer
- Avnet BCM4343W IoT Starter Kit
- Adafruit Mini 8x8 LED Matrix Display Backpack (I2C), fitted with Pmod-compatible 6x1 right-angle connector
<https://www.adafruit.com/products/870>

Application Documentation Online

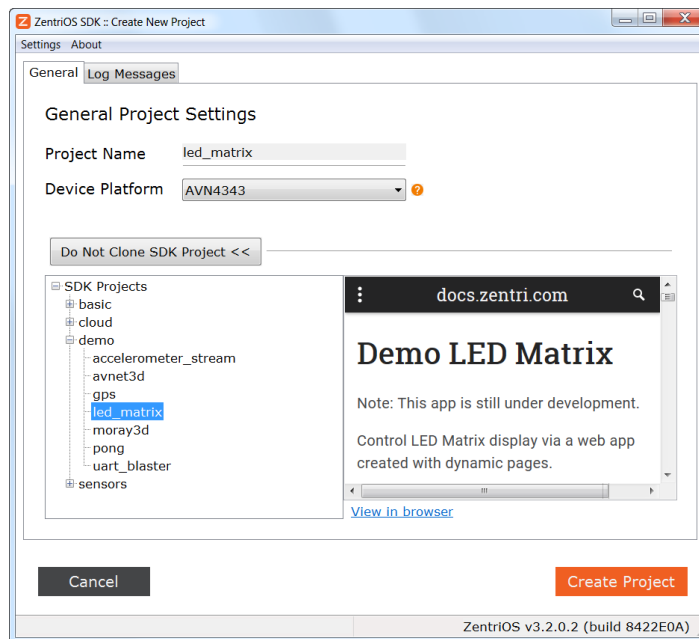
<https://docs.zentri.com/zentrios/wz/latest/sdk/examples/demo/led-matrix>



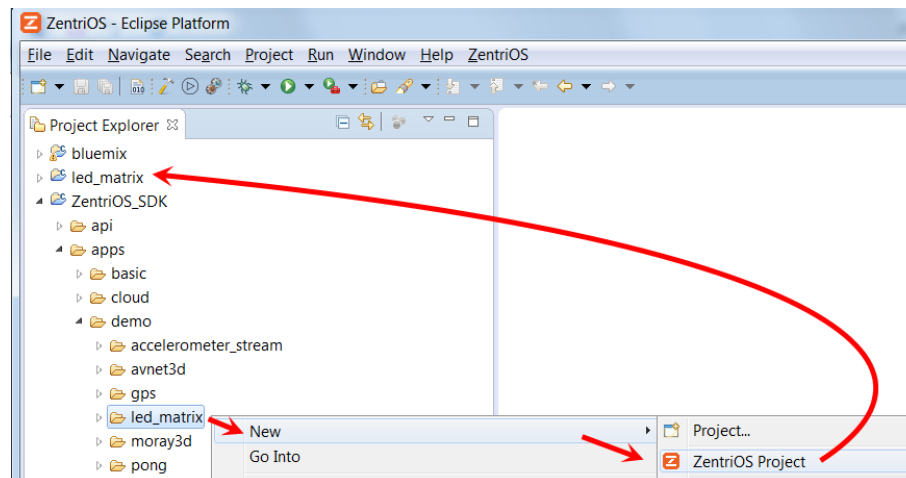
Procedure

1. Set up the Zentri Application (ZAP)

- Connect a USB cable from the Avnet BCM4343W IoT Starter Kit to your Laptop Computer. Open the Tera Term Serial Console application. Make sure correct COM port is selected, Baud rate = **115200, 8N1N**. If ever you disconnect the board, press Alt-N to re-sync the Serial Port, then click the terminal window and press <Enter>
- We will start by making a cloned copy of the **led_matrix** demo application. Within the Zentri IDE, click the small triangle next to **ZentriOS SDK** to open-up the view of the SDK folders, then navigate down to **\apps\demo**
- Right click the '**led_matrix**' folder located there and select **New -> ZentriOS Project**. The Create New Project dialog will appear. Use the same name and select again the **led_matrix** project from which the new project is to be cloned



- An editable version of **led_matrix** will now appear listed in the workspace area above the ZentriOS_SDK folders



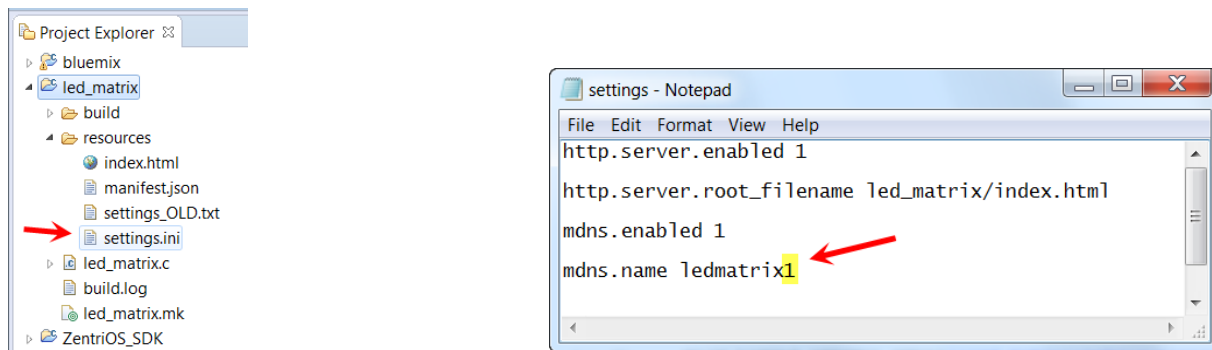
- Open-up the newly created **led_matrix** folder as well as the **resources** sub-folder listed below it
- Open the **led_matrix.c** file, scroll down to **line 65**.
Delete the **“.local”** from the text string, then press **Ctrl-S** to save

```

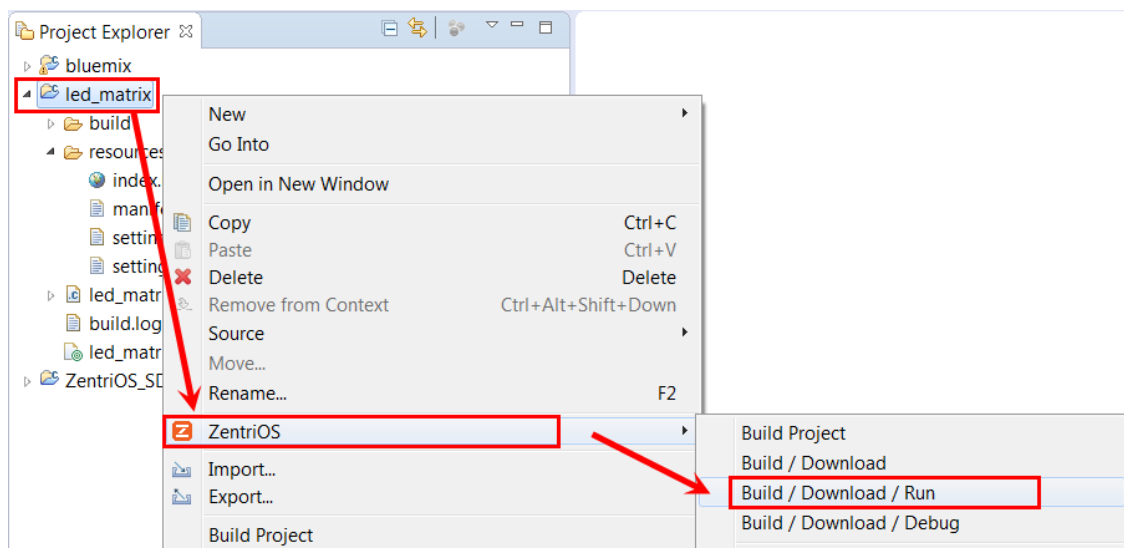
63     else
64     {
65         ZOS_LOG("From your browser, enter the URL: http://%.local/ to control the display", ZOS_GET_SETTING_STR("mdns.name", buffer));
66     }
    
```

- In the **resources** folder, double-click the **settings.ini** file, to open this (this will open in notepad, not the IDE’s editor)
Edit the **mdns.name** setting, by suffixing the index number of your laptop station to the **ledmatrix** label that follows it, then Save and Exit Notepad

This to ensure unique DNS names (ledmatrix1...12) are allocated for the multiple IoT boards in use at same time in this workshop



- Right click on the ‘led_matrix’ folder in the workspace, select **“ZentriOS”**, then click on **“Build / Download / Run”**.





- After successful build and download of this application to the hardware (takes about 1 minute), check the **serial console** application to view the initialization output messages from the hardware
- You will need to provide the WiFi network settings to your board from this serial console. Start with a mouse click on the console window, press the enter key once to enter command mode, then type “**network_up -s**” into the console.

```
Ready
> network_up -s
Scanning for networks...
! 29 networks found
```

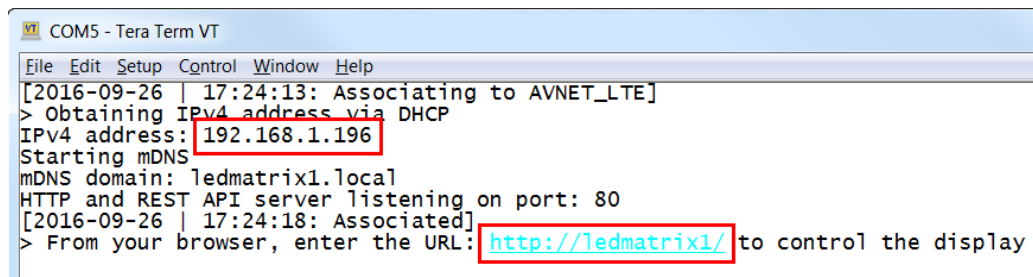
- Locate your network and its ‘#’ on the list that appears. Enter your network number into the console followed by the password. Once connected, type “**save**” to have the device remember the network.

```
Type the number # that matches your Network: 11
Type the password for your Network : 1234!
In progress
[2000-01-01 | 00:42:20: Associating to ASUS]
> > Security type from probe: WPA2-AES
Obtaining IPv4 address via DHCP
IPv4 address: 192.168.43.203
[2000-01-01 | 00:42:28: Associated]
> save
Saved
Success
```

TROUBLESHOOTING: If you are having issues connecting your board to local WiFi, try utilizing a mobile hotspot instead.

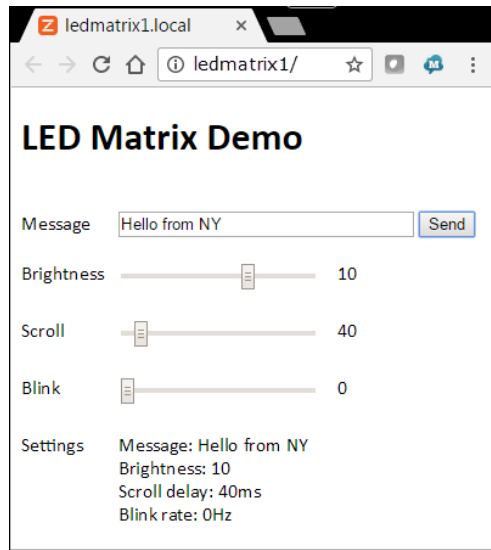


- Now, press the reset button on the board to reboot the program or type ‘**reboot**’ at the console command-line prompt...
- Double click the link provided to open the webserver page on your laptop (Note: The device on which browser is launched must be connected to the same Wi-Fi Access Point as the board!)



```
COM5 - Tera Term VT
File Edit Setup Control Window Help
[2016-09-26 | 17:24:13: Associating to AVNET_LTE]
> Obtaining IPv4 address via DHCP
IPv4 address: 192.168.1.196
Starting mDNS
mDNS domain: ledmatrix1.local
HTTP and REST API server listening on port: 80
[2016-09-26 | 17:24:18: Associated]
> From your browser, enter the URL: http://ledmatrix1/ to control the display
```

- If the webpage fails to display using the DNS name assignment, then use the IPv4 address (this was reported in your terminal window in the format 192.168.1.xxx) as the browser address...

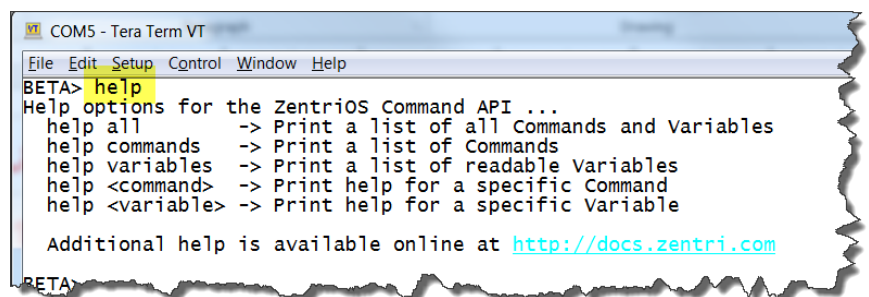


- The **LED Matrix Demo** webpage should now display in your browser.
- Enter different custom messages (followed by click on Send) to change what is scrolled across the LED Matrix display
- Try different settings of the sliders for Brightness, Scroll Speed and Blink Rate
- The display in each case should immediately update with new messages scrolled across the display and/or the display characteristics changed according to the latest slider settings
- This concludes Lab1

Extra Credit! – Explore ZentriOS Commands and Variables

Try the following at the Serial Console's command-line prompt (follow each with <Enter>)

- help**
- help commands**
- help variables**
- get all**
- get wlan**



Try also the command abbreviations, eg.
get wl n g (ie. same as: **get wlan network gateway**)

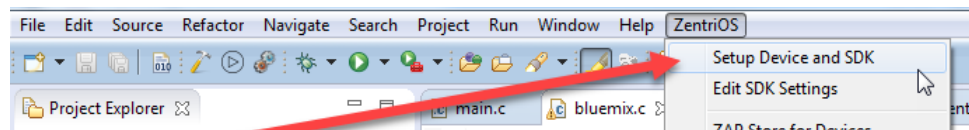
Ping the reported Gateway IP address, ie.
ping 192.168.1.1

Explore other commands and variables, as well as the online Zentri documentation...
<http://docs.Zentri.com>



Appendix – ZentriOS “Setup Device and SDK”

- If you commenced this project with a new BCM4343W IoT Kit that has not been initialized with ZentriOS, there is an additional step required before you can interact with the board from the Zentri IDE.
- In this case, after connecting the USB cable from the BCM4343W IoT Starter Kit to your computer, select the “ZentriOS” tab from the main menu and click “Setup Device and SDK”. Select the OS version when prompted, then click “Finish” once the process has completed.



- **Note!** In the workshop setting, this step should *not* be done if the board has already been provisioned as it will download and program over a megabyte to the board (internal flash and SPI flash) and if a different version OS inadvertently selected then and SDK update (over 55 MB) will also be downloaded!

Useful Links:

ZentriOS SDK download:

<https://docs.zentri.com/zentrios/wz/latest/sdk/user-guide/getting-started>

Avnet IoT Kit documents and reference designs:

<http://cloudconnectkits.org/product/avnet-bcm4343w-iot-starter-kit>

Avnet Technical Support Discussion Forums:

<http://cloudconnectkits.org/forum>

Zentri documentation:

<http://docs.Zentri.com>
